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TECTONIC PHYSICS SUB-PROGRAM STRUCTURAL GEOLOGY OF BOLIVIA'S NORTHERN HIGH PLATEAU (SOUTHERN PERU AND NORTHERN CHILE)

C. Martinez

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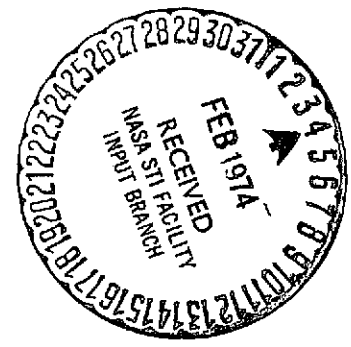

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INTERPRETATION OF TWO ERTS-1 SATELLITE IMAGES /1*

C. Martinez

Structural Geology of Bolivia's Northern High Plateau
(Southern Peru and Northern Chile)

- From 16°30' to 18°00' Southern latitude, approximately
- From 67°30' to 70°00' Western longitude, approximately

INTRODUCTION

This report is based on two images from the ERTS-1 satellite.

- Photograph No. 1010-1403 3 and photograph No. 1065-1409 1, 9(4-5-6-7) scale 1: 1,000,000.
- Enlargement of band 6 of 1010-1403 3 and band 7 of 1065-1409 1 on these photographs, to scale 1:500,000.

To interpret photograph No. 1010-1403 3, we used S. Kusmaull, J. Meave and P. Tomasi's results in the area limited by the Desaguadero River and the 18°00' parallel South.

The general purpose was to attempt a purely photogeological interpretation, to evaluate the contribution this type of study can make to already acquired geological information. However, the field experience obtained in a detailed study of the High Plateau,

* Numbers in the margin indicate pagination of the original foreign text.

performed in cooperation with the geologists P. Tomasi and T. Subieta, proved essential to a good understanding of the photogeological observations.

As we plan to publish a structural schematic of the High Plateau, in this preliminary notice we shall limit ourselves to present the truly new observations derived from the ERTS-1 satellite photographs.

PHOTOGEOLOGICAL OBSERVATIONS /2

As S. Kussmaul, J. Meave and P. Tomasi already pointed out, photogeological observations not visible by conventional methods (aerial photography, detailed mapping) are of two kinds:

- lineaments of regional scope
- differentiation of volcanic deposits

Since classical methods (field geology, literature search) provide a fairly detailed knowledge of the area under study, satellite photographs can also be used to improve geological mapping of the various formations of the High Plateau, provided they cover a large enough surface area. Thus, abnormal contacts (faults, abnormal formations) and discordancies can be located or inferred.

1. Lineaments of regional scope:

Lineaments from different directions can be recognized on the photograph:

- N-S to N.150E lineaments or faults, such as the Coniri fault, Luribay fault, Ayo-Ayo fault, San Andres de Machaca fault.
- N.030 to N.045E. faults, such as the Santiago de Machaca fault.
- E-W to N.120E. lineaments or faults, such as the Patacamaya fault, and the fault South of the Tiahuanacu Sierras.

The group describes a system of fractures of which some appear to have various successive movements.

2. Volcanic deposits: /3

Just as Kussmaul, Meave and Tomasi did, we have differentiated between different types of volcanic deposits.

- Fissural type deposits: lava flow extensions of the Perez formation (QIv) sinters.
- Central type deposits: pre (Tev) or post (Qev) Perez volcanic constructions, among which the pre (QevI-2) and post (Qev 4-5) glacial ones stand out.

The relation between fractures and volcanic bodies is remarkable. The NW-SE direction in which Peruvian and Bolivian volcanoes are lined up, could have its explanation in an extended fault following the same direction.

3. Discordancies and abnormal contacts:

The following successive discordancies have been differentiated:

- Paleozoic-Tertiary
- Lower tertiary (TI) and intermediate tertiary (T2)
- Intermediate tertiary and upper tertiary (T3)
- Upper tertiary and Perez formation (QIv)
- We have also identified some quaternary deposits.
  Old quaternary (Q2)
  Lake Ballivian quaternary (Q3)
  Recent quaternary (Q)

Among abnormal contacts, the abnormal formations at Corocoro were delineated approximately.

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16. Abstract

This report is based on two images from the ERTS-1 satellite. The purpose of the article is to attempt a photogeological interpretation of these images, and to evaluate the contribution this type of study can make to already acquired geological information.

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